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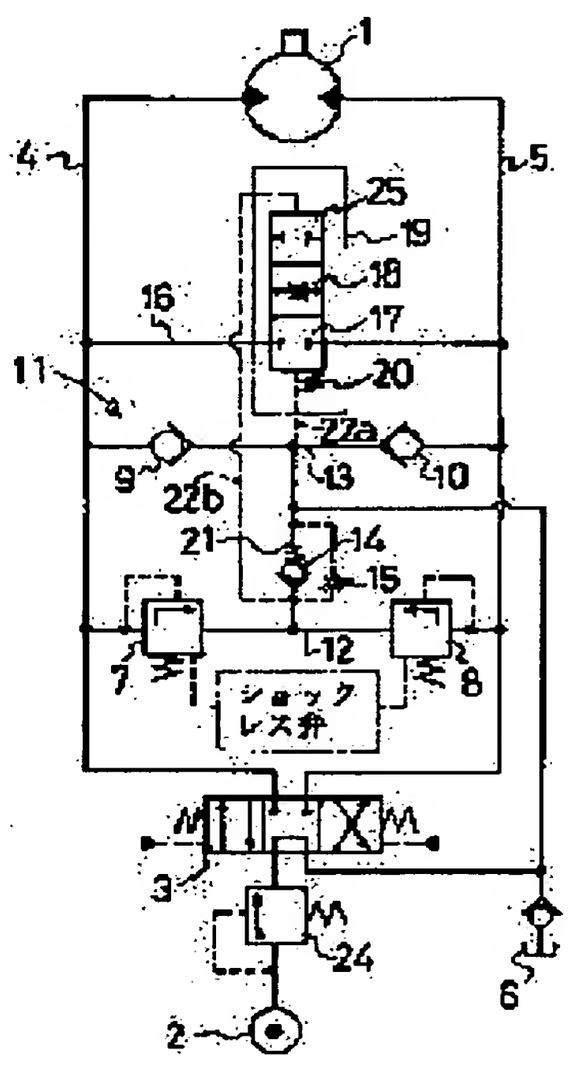
(54) SWING-BACK PREVENTION DEVICE

(57)Abstract:
PURPOSE: To prevent deterioration of volumetric efficiency caused by providing a swing-back prevention device.
CONSTITUTION: A spring loaded type check valve 14 and a flow metering valve 15 in parallel with it are provided between a tank returning circuit 12 of relief valves 7, 8 of brake valve applying a brake to a hydraulic motor 1 and the inflow circuit 13 from a tank 6 to check valves 9, 10. A spool type shortcircuit valve 19 having a closing position 17, a flow metering position 18, and a second closing position 25, and energized by a spring 20 is provided on a short circuit 16 between round trip pipe lines 4, 5, the spring side of the spool of the short- circuit valve is connected to the tank, and the opposite side is connected to the tank returning circuit on the upper stream side of the spring loaded type check valve. Hereby, volumetric efficiency of the hydraulic motor is improved.



LEGAL STATUS

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CLAIMS

[Claim(s)]
[Claim 1] The relief valve which discharges the fluid of this duct to a tank to the duct of the round trip which ties a change-over valve and a hydraulic motor, The brake valve which consisted of check valves which permit the inflow of the fluid of tank return is prepared in this duct, and a brake is given to this hydraulic motor. Between the tank return circuit of this relief valve, and the inflow circuit of this check valve The spring load form check valve opened with the fluid from this tank return circuit and a throttle valve parallel to this are prepared. While closing to the short circuit to which between the ducts of this round trip was connected, extracting as a location and having a location, the by-pass valve of the spool form energized with the spring is prepared in this closing location direction. In the shake return arrester which connected ** of the opposite side to the tank return circuit of the upstream of this spring load form check valve while connecting the spring side house of a spool of this by-pass valve to the tank The shake return arrester characterized by establishing the 2nd closing location in the location which extracted to this by-pass valve as this closing location, stir-fried this spring other than a location to it, and was moved to it across this diaphragm location.
[Claim 2] The shake return prevention valve according to claim 1 characterized by making the 2nd check valve which permits the flow of the fluid to ** of this opposite side, and a throttle valve parallel to this placed between the pilot lines which connect the spring side house of a spool of the above-mentioned by-pass valve, and ** of the opposite side to the tank return circuit of the upstream of the above-mentioned spring load form check valve.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the shake return arrester which prevents the condition of stopping while a hydraulic motor carries out a forward inversion at the time of the halt.
[0002]
[Description of the Prior Art] Conventionally, generally in the hydraulic circuit which drives revolving superstructures, such as a hydraulic excavator, brake valve c which combined relief-valve a like drawing 1 and check-valve b is used. Although the change-over valve g prepared in the ducts e and f of the round trip is returned to a center valve position and Ducts e and f are closed when stopping hydraulic-motor d which drives a revolving superstructure in this hydraulic circuit, since it is circling, a pump action is carried out, relief-valve a operates, and the brake pressure force goes up and stops this hydraulic-motor d. However, after a revolution halt, since residual pressures differ by A port and the B port, a shake return phenomenon occurs in hydraulic-motor d. For example, if Motor d returns a change-over valve g to a center valve position in the condition of circling in the direction of an arrow head and applies brakes, high pressure will occur in the duct f by the side of a B port. The pressure PB of the B port at that time, and pressure PA of A port by the side of pushing It changes like drawing 2 and the rotational wave form of Motor d is changed like Curve C.
[0003] That is, when a change-over valve g is returned to a center valve position, a B port side is a pressure PB. A pressure up is carried out. In R points, relief-valve a carries out a receipt after that. Pressure PB which carries out a receipt Since it is still high, in the duct f by the side of a B port, it is the pressure PB. It will be completely filled. Then, it is the B port lateral pressure PB by the backlash of the accumulator effectiveness by the piping volume of the duct f by the side of a B port, and a revolving-superstructure system etc. Becoming the energy which reverses hydraulic-motor d, this hydraulic-motor d rotates to an arrow head and an opposite direction. Then, hydraulic-motor d carries out a pump action like the time of the aforementioned brake, and it is PA shortly. PB It becomes high. Pressure PA If it becomes high, hydraulic-motor d will rotate in the direction of an arrow head again. They are pressures PA and PB as mentioned above. Since it becomes high by turns, hydraulic-motor d stops starting several times of shake return.
[0004] In order to prevent such shake return, many means are proposed for some time and it can divide roughly into what prepared the shake return prevention valve in each duct, and the thing which was made to short-circuit each duct and prepared the shake return prevention valve as the means. Since the latter means can put together to one valve rather than the former means, there is an advantage to which circuitry is simplified and manufacture, assembly piping, and maintenance become easy.
[0005] What formed the on-off valve h as shown in drawing 3 as an example of the latter means (JP,57-1803,A) is well-known. However, since what prepared such an on-off valve must change the working pressure (spring action) of an on-off valve with the setting pressure of a relief valve and the working pressure of an on-off valve is influenced by the setting pressure of a relief valve, it becomes high pressure, and the load of a spring becomes high, therefore there is a fault that speed adjustment of the closing motion valve of an on-off valve is difficult.
[0006] As [show / previously / an applicant / in order to solve such a fault / drawing 4] In what gave the brake to hydraulic-motor d by brake valve c which consisted of relief-valve a and check-valve b between the tank return circuit i of this relief-valve a, and the inflow circuit j of this check-valve b Spring load form check-valve k opened with the fluid pressure of this tank return circuit i and throttle valve l parallel to this are prepared. With the pressure before and behind this spring load form check valve The equipment it was made to operate the by-pass valve q of the spool form which was prepared in the short circuit m to which

between the ducts e and f of a round trip of hydraulic-motor d was connected, and which was energized with the spring p in this closing location direction while closing, extracting as the location n and having a location o was proposed (application-for-utility-model-registration Taira No. 1504 [five to]).
[0007]
[Problem(s) to be Solved by the Invention] Although there is simplicity that the transit time of a by-pass valve q can be adjusted to arbitration by adjustment of throttle valve l, with the equipment shown in drawing 4 , a by-pass valve q extracts also at the time of starting of hydraulic-motor d, it moves to a location o, a part of supply flow rate to hydraulic-motor d flows into the duct of a return end from the duct by the side of supply through a short circuit m, and it is accompanied by un-arranging [to which the effectiveness of hydraulic-motor d worsens].
[0008] As for the cause, circuit relief-valve r is usually prepared in the supply circuit to a change-over valve g from the pump for circuit protection. The relief setting pressure of this is in the relief setting pressure of relief-valve a of brake valve c, abbreviation, etc. by carrying out, and it is set as extent in many cases. In such a case, both the relief valves a and r interfere and operate at the time of starting of a hydraulic motor, and a by-pass valve q extracts, it switches to a location o, a part of flow rate supplied to hydraulic-motor d is bypassed by the duct of return, the supply flow rate to hydraulic-motor d becomes less, and the volume efficiency worsens. Moreover, it becomes [there is almost no flow of an oil in the pilot lines s and t which lead the differential pressure before and behind check-valve b to a by-pass valve q, therefore if atmospheric temperature is low, the viscosity of the oil of pilot lines s and t will remain always high, / the time amount which closing motion of a by-pass valve q takes is prolonged, and / actuation of shake return prevention] slow and is not desirable.
[0009] This invention carries out the purpose of preventing decline in the volume efficiency of the hydraulic motor by having prepared the spring load form check valve and the throttle valve in the tank return circuit of the relief valve which constitutes a brake valve in parallel, and having formed the shake return arrester which controls actuation of the by-pass valve which extracts as the closing location which short-circuits the duct of a round trip by the differential pressure before and behind this, and has a location.
[0010]
[Means for Solving the Problem] The relief valve which discharges the fluid of this duct to a tank to the duct of the round trip which ties a change-over valve and a hydraulic motor with this invention, The brake valve which consisted of check valves which permit the inflow of the fluid of tank return is prepared in this duct, and a brake is given to this hydraulic motor. Between the tank return circuit of this relief valve, and the inflow circuit of this check valve The spring load form check valve opened with the fluid from this tank return circuit and a throttle valve parallel to this are prepared. While closing to the short circuit to which between the ducts of this round trip was connected, extracting as a location and having a location, the by-pass valve of the spool form energized with the spring is prepared in this closing location direction. In the shake return arrester which connected ** of the opposite side to the tank return circuit of the upstream of this spring load form check valve while connecting the spring side house of a spool of this by-pass valve to the tank The above-mentioned purpose was attained by establishing the 2nd closing location in the location which extracted to this by-pass valve as this closing location, stir-fried this spring other than a location to it, and was moved to it across this diaphragm location.
[0011]
[Function] At both the times of usual rotation of a hydraulic motor, since the pushing side and outlet side of this hydraulic motor are low voltage, the relief valve of a brake valve does not operate, but a by-pass valve remains closing. Although a pump action is performed, the pressure of the outlet side of this hydraulic motor will increase, this relief valve will operate and a fluid will flow through the check valve of a spring load form on a tank from this relief valve in order that a hydraulic motor may rotate by inertia if a change-over valve is returned to a center valve position Since the spring of this by-pass valve is weaker than the spring of this spring load form check valve, a by-pass valve extracts, a location is passed and it moves to the 2nd closing location, and the pressure of an outlet side duct is discharged through this spring load form check valve, and requires a brake. Since the brake pressure force becomes low gradually just before a halt of a hydraulic motor, a by-pass valve is prevented by circulating through the pressure up of the outlet side of a hydraulic motor, while extracting, and return and this by-pass valve extracting to a location and being in a location, and circulating a fluid to a pushing side, and shake return is prevented. Although the relief valve of this brake valve may open by the pressure generated in the duct by the side of supply at the time of starting of a hydraulic motor, since comparatively a lot of fluids flow this relief valve in such a case, comparatively big differential pressure occurs before and after a spring load form check valve, and by this differential

pressure, this by-pass valve resists the spring of this, and moves to the 2nd closing location of a stroke end. Therefore, a short circuit is not opened and does not reduce the volume efficiency of a hydraulic motor.
[0012]
[Example] If the example of this invention is explained based on a drawing, in drawing 5 , a sign 1 will be the hydraulic motor which drives the ducts (or oilway) 4 and 5 connected to the hydraulic pump 2 through the change-over valve 3 by flowing fluid, and the revolving superstructure of a hydraulic excavator etc. will be connected with this hydraulic motor 1. The brake valve 11 which consisted of relief valves 7 and 8 which discharge the high-pressure fluid of each duct on a tank 6, and check valves 9 and 10 for supplementing each duct with a fluid from a tank 6 is formed at each of these ducts 4 and 5. 12 is a tank return circuit from relief valves 7 and 8, and shared a part of this circuit 12 with the inflow circuit 13 of check valves 9 and 10.
[0013] In order to prevent the shake return at the time of a halt of this hydraulic motor 1, the by-pass valve 19 which forms the spring load form check valve 14 opened with the fluid from this tank return circuit 12 and the throttle valve 15 parallel to this between the tank return circuit 12 of these relief valves 7 and 8 and the inflow circuit 13 from the tank of these check valves 9 and 10, closes to this duct 4 and the short circuit 16 to which between five was connected, extracts as a location 17, and has a location 18 is formed. In the steady state, this by-pass valve 19 was a by-pass valve of the spool form pushed with the weak spring 20, as it closed and was located in a location, and it connected to the tank return circuit 12 of the upstream of this spring load form check valve 14 ** of the opposite side which the other end of this spool faces by pilot line 22b while it connected to the tank the spring side house which the end of a spool of this by-pass valve faces by pilot line 22a. The valve-opening pressure of the spring 21 of this spring load form check valve 14 enabled it to adjust time amount which it shall set up more highly than the valve-opening pressure of the spring 20 of a by-pass valve 19, this throttle valve 15 is constituted in a variable aperture, and this by-pass valve 19 extracts, closes from a location 18, and moves to a location 17. 24 is the circuit relief valve prepared ahead of a change-over valve 3, and the setting pressure of this is set up more than the setting pressure of the relief valves 7 and 8 of a brake valve 11, an EQC, or it.
[0014] Since both the pushing side and outlet side of this hydraulic motor 1 are low voltage when according to the above configuration a change-over valve 3 is switched, the discharge flow object of a hydraulic pump 2 is flowing from the duct 4 to the duct 5 through the hydraulic motor 1 and this hydraulic motor 1 is driving the revolving superstructure, relief valves 7 and 8 do not operate. When returning this change-over valve 3 to a center valve position and stopping rotation of this hydraulic motor 1, a hydraulic motor 1 performs a pump action according to inertia, the pressure of the duct 5 where the outlet side of a motor 1 was closed increases, and it acts in order open that a relief valve 8 should eliminate the pressure of a duct 5, extract a by-pass valve 19 through pilot circuit 22b while the pressure is discharged through the spring load form check valve 14 to a tank 6, and to switch to a location 18. Although brakes are applied to a hydraulic motor 1 according to the brake pressure force generated in this duct 5, as the curve D of drawing 6 shows the brake pressure force, it falls gradually just before a halt of this hydraulic motor 1, and when the brake pressure force falls even to R points, the receipt of the relief valve 8 is carried out, and it will be in a clausilium condition. Although **** return will occur in a hydraulic motor 1 since the pressure remains in the duct 5 of an outlet side when [this] a receipt is carried out Since a by-pass valve 19 has a throttle valve 15 even if a relief valve 8 carries out a receipt by having considered as the above-mentioned configuration, it is pushed on a spring 20 and changes from a valve-opening condition to a clausilium condition gradually like the curve F of drawing 6 . Since it circulates through the brake pressure force which remains in this duct 5 to the duct 4 by the side of pushing through this by-pass valve 19 even if a hydraulic motor 1 stops in the meantime, it stops without a hydraulic motor's 1 shaking by the pressure up of an outlet side, and returning at the time of a halt of a hydraulic motor 1. The time amount which a by-pass valve 19 extracts, closes from a location 18, and moves to a location 17 can be set as the spring load form check valve 14 free by opening adjustment of the concurrent throttle valve 15.
[0015] Although there is no difference between especially the equipment that the applicant proposed previously, and such a configuration and an operation, in this invention The 2nd closing location 25 is established in the location which extracted to this by-pass valve 19 as this closing location 17, stir-fried this spring 20 other than a location 18 to it, and was moved to it across this diaphragm location 18. Even if the relief valves 7 and 8 of a brake valve 11 open, when the differential pressure before and behind the spring load form check valve 14 is not the range of a schedule, a short circuit 16 is closed down, and this prevented decline in the volume efficiency of the hydraulic motor 1 at the time of actuation of a brake valve.
[0016] Since it is a spooled type valve, this by-pass valve 19 is extracted by forming the 2nd closing location 25, and a location 18 turns into a middle location, and differential pressure closes it according to

magnitude, and it switches to a location 17, the diaphragm location 18, or the 2nd closing location 25. When a change-over valve 3 is switched from a center valve position and a hydraulic motor 1 is started Although a part of flow rate of the duct which the relief valve 7 of a brake valve 11 or 8 opens, and is supplied to a hydraulic motor 1 is emitted to a tank 6 in many cases since the load pressure of a hydraulic motor 1 is large In this case, since the differential pressure before and behind the spring load form check valve 14 becomes comparatively large In order that a by-pass valve 19 may resist a spring 20, may switch to the 2nd closing location 25 and may intercept a short circuit 16, except the flow rate emitted to this relief valve 7 or a tank 6 from 8, it will be supplied to a hydraulic motor 1 and its volume efficiency of this improves. The flow rate which the relief valve 7 of a brake valve 11 or 8 closed since the pressure of the duct by the side of pushing became lower than the time of starting when the hydraulic motor 1 became acceleration or constant-speed rotation, both the pilot lines 22a and 22b became tank **, closed the by-pass valve 19 with the spring 20, was returned to the location 17, and was supplied to the duct by the side of pushing circulates through a hydraulic motor 1, and it returns to a tank from an outlet side duct. Although a pump action is performed, the pressure of the outlet side increases, this relief valve 7 or 8 operates and a fluid flows through the spring load form check valve 14 on a tank from this relief valve in order that a hydraulic motor 1 may rotate by inertia when a change-over valve 3 is returned to a center valve position for a halt of a hydraulic motor 1 Since the spring 20 of this by-pass valve 19 is weaker than the spring of this spring load form check valve 21 Before this spring load form check valve 21 opens, a by-pass valve 19 extracts, a location 18 is passed, and it moves to the 2nd closing location 25, and after that, the pressure of an outlet side duct is discharged through this spring load form check valve, and a brake starts for the pressure of this outlet side duct. It prevents by circulating through the pressure up of the outlet side of a hydraulic motor, while extracting a by-pass valve 19 in the place where the brake pressure force became low gradually just before the halt of a hydraulic motor 1 at, and that pressure turned into a setting pressure and being in a location 18 in return and this location, and circulating a fluid to a pushing side, and shake return is prevented.

[0017] Although a by-pass valve 19 will be closed for the 2nd check valve 29 and it will operate quickly in the 2nd closing location [a location 17 to] 25 direction if the 2nd check valve 29 and the 2nd adjustable throttle valve 30 parallel to this are made to be placed between these pilot line 22a as shown in drawing 7 The 2nd throttle valve 30 can be adjusted to the hard flow, the return operating time can be adjusted, the time amount in the diaphragm location 18 can be prolonged, and the capacity of shake return prevention can be raised. In addition, the spring side house of a spool of this by-pass valve 19 and ** of the opposite side were made to open for free passage by the connection circuit 28 through the path 27 of a throttle valve 26 and the diaphragm location 18, and when this by-pass valve 19 extracted and it was located in a location 18, both ** were made for the oil with which the oil temperature which passed relief valves 7 and 8 rose to flow in the example of drawing 7 .

[0018]

[Effect of the Invention] When based on this invention as mentioned above, between the tank return circuit of the relief valve of a brake valve, and the inflow circuit of a check valve In the shake return arrester of the format of preparing a spring load form check valve and a throttle valve parallel to this, and leading the pressure before and behind this to the by-pass valve of the spool form pushed with the spring of a short circuit Since the 2nd closing location was established in the location which extracted to this by-pass valve as this closing location, stir-fried this spring other than a location to it, and was moved to it across this diaphragm location Un-arranging [which is short-circuited through this short circuit at the time of starting] is canceled, and the effectiveness that the volume efficiency of a hydraulic motor improves is acquired. Since the 2nd check valve and the 2nd throttle valve parallel to this were prepared in the pilot line which connects the upstream of this by-pass valve and this spring load form check valve, the time amount which this by-pass valve extracts and operates in a location can be adjusted, and there is effectiveness, such as becoming use top convenience.

[Translation done.]

* NOTICES *

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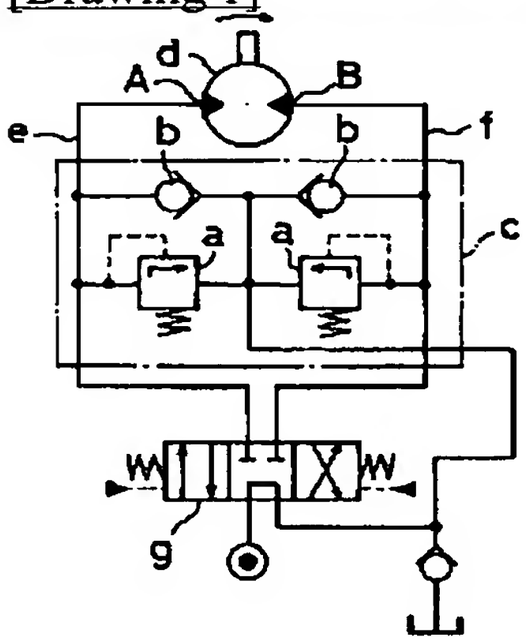
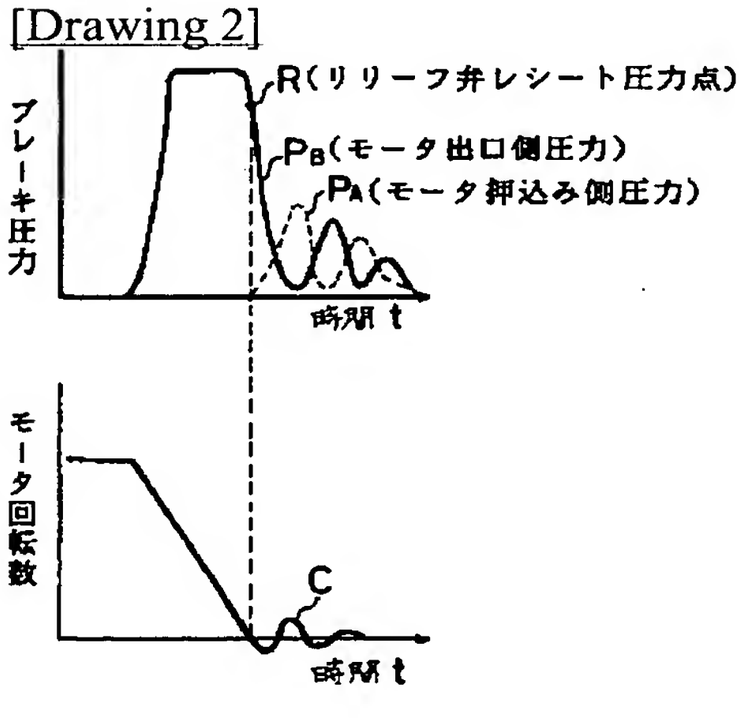
DRAWINGS

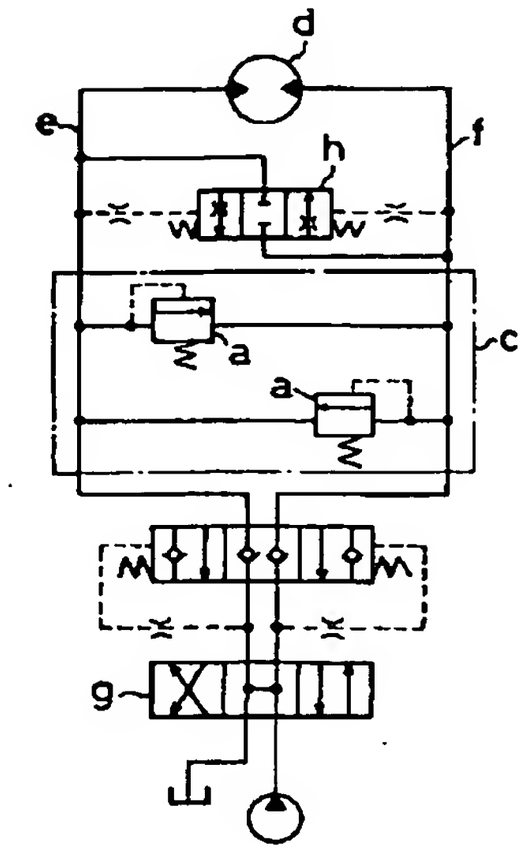
[Drawing 1]



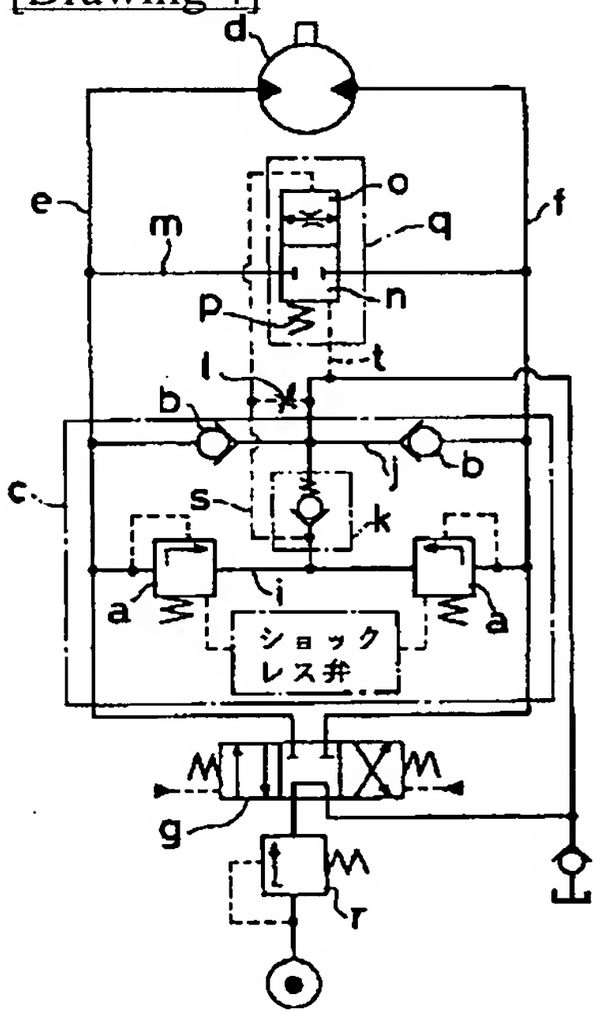
[Drawing 2]



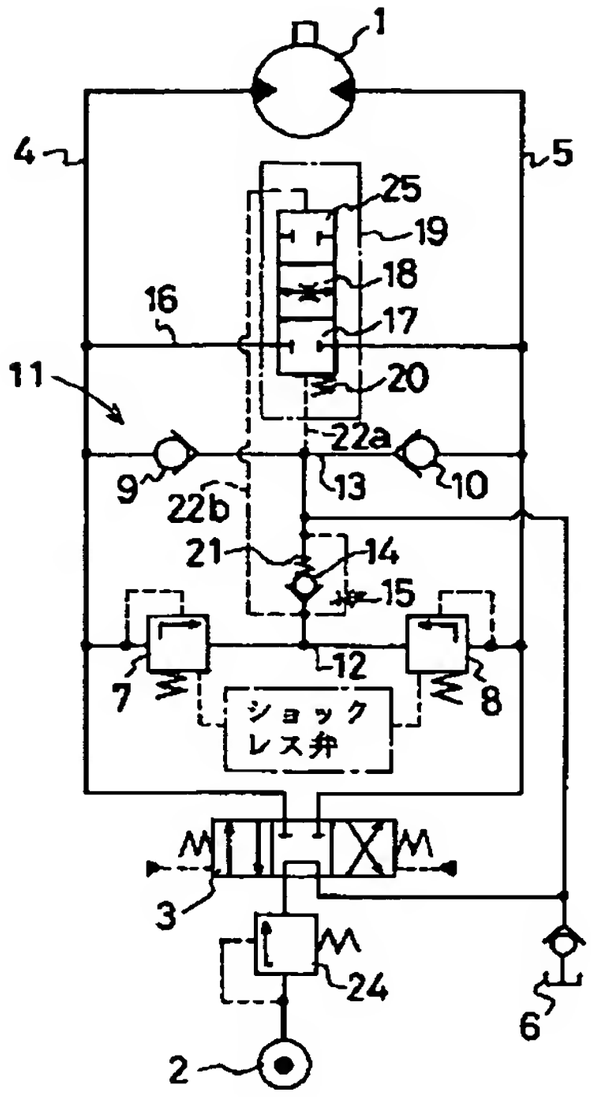
[Drawing 3]



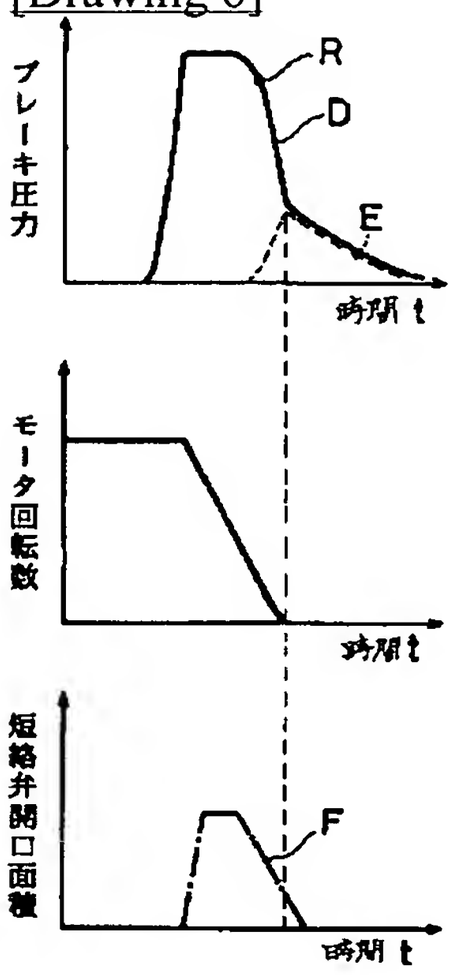
[Drawing 4]



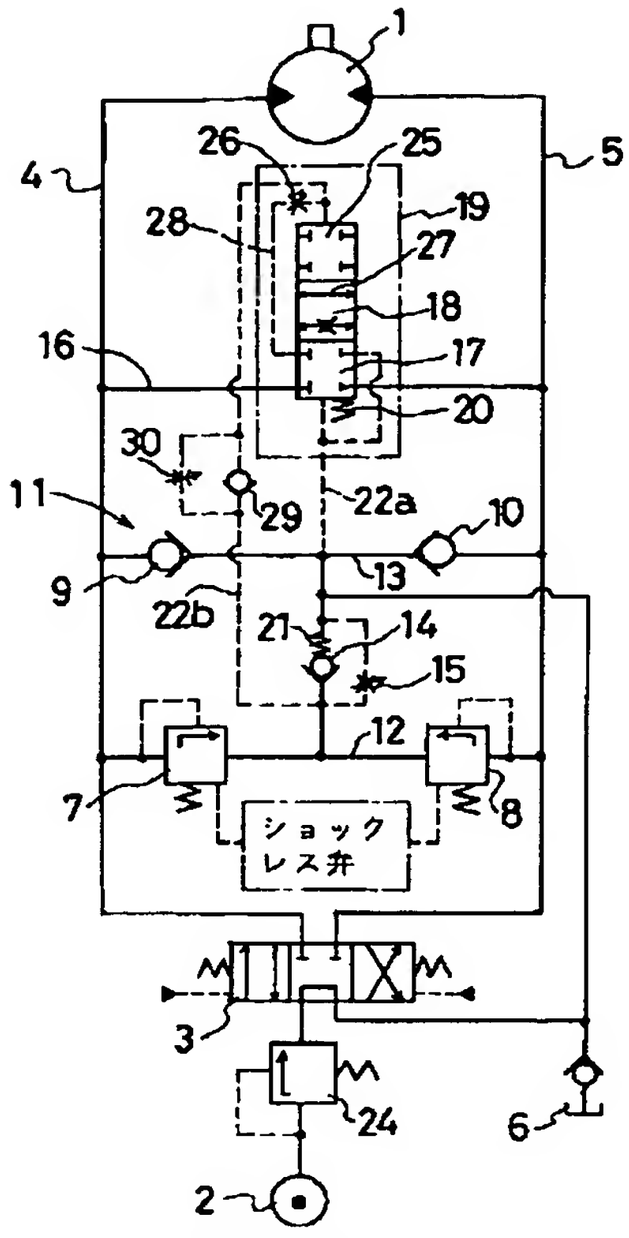
[Drawing 5]



[Drawing 6]



[Drawing 7]



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Ｅ０２Ｆ　9/22			Ｅ０２Ｆ　9/22	Ｃ	
		9037－3Ｊ	Ｆ１５Ｂ　11/00	Ｒ	

審査請求　未請求　請求項の数２　ＯＬ　（全 6 頁）

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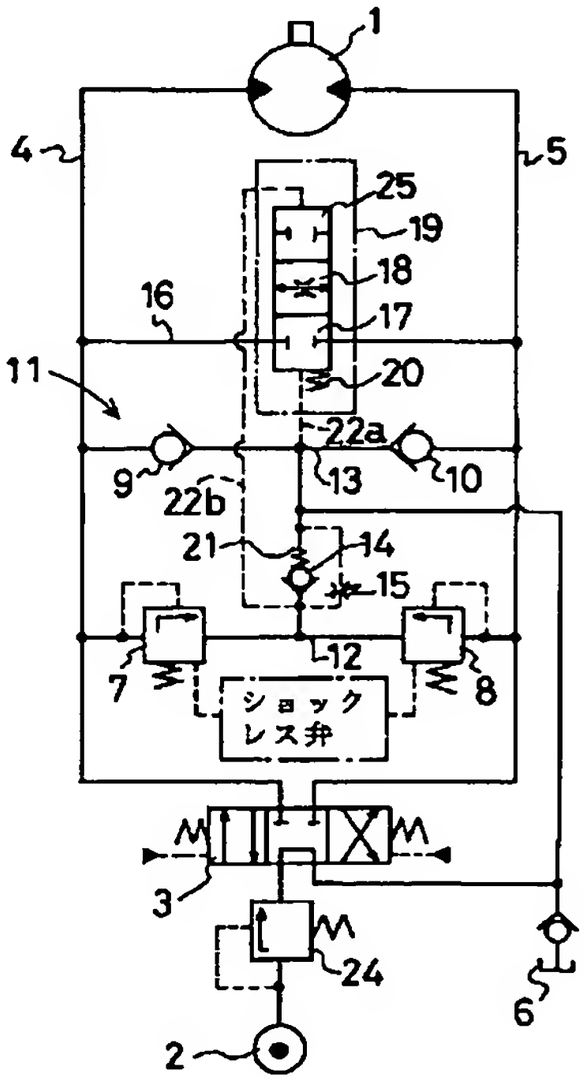
(54)【発明の名称】　揺れ戻り防止装置

(57)【要約】
【目的】揺れ戻り防止装置を設けたことによる油圧モータの容積効率の低下を防止すること
【構成】油圧モータ１にブレーキを与えるブレーキ弁のリリーフ弁７、８のタンク戻り回路１２とチェック弁９、１０のタンク６からの流入回路１３との間に、ばね負荷形チェック弁１４とこれに並行な絞り弁１５とを設け、往復の管路４、５間の短絡回路１６に閉じ位置１７と絞り位置１８及び第２閉じ位置２５を有するばね２０により付勢されたスプール形の短絡弁１９を設け、該短絡弁のスプールのばね側をタンクに接続し、その反対側を該ばね負荷形チェック弁の上流側のタンク戻り回路に接続する。
【効果】油圧モータの容積効率が向上する



【特許請求の範囲】

【請求項１】切換弁と油圧モータとを結ぶ往復の管路に、該管路の流体をタンクへ排出するリリーフ弁と、該管路へタンク戻りの流体の流入を許容するチェック弁とで構成されたブレーキ弁を設けて該油圧モータにブレーキを与えるようにし、該リリーフ弁のタンク戻り回路と該チェック弁の流入回路との間に、該タンク戻り回路からの流体により開かれるばね負荷形チェック弁とこれに並行な絞り弁とを設け、該往復の管路間を結んだ短絡回路に閉じ位置と絞り位置を有すると共に該閉じ位置方向にばねにより付勢されたスプール形の短絡弁を設け、該短絡弁のスプールのばね側室をタンクに接続すると共にその反対側の室を該ばね負荷形チェック弁の上流側のタンク戻り回路に接続した揺れ戻り防止装置に於いて、該短絡弁に、該閉じ位置と絞り位置の他に該ばねを撓めて該絞り位置を越えて移動した位置に第２閉じ位置を設けたことを特徴とする揺れ戻り防止装置。

【請求項２】上記短絡弁のスプールのばね側室と反対側の室を上記ばね負荷形チェック弁の上流側のタンク戻り回路へ接続するパイロットラインに、該反対側の室への流体の流れを許容する第２チェック弁とこれに並行な絞り弁を介在させたことを特徴とする請求項１に記載の揺れ戻り防止弁。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、油圧モータがその停止時に正逆転しながら停止する状態を防止する揺れ戻り防止装置に関する。

【０００２】

【従来の技術】従来、油圧ショベル等の旋回体を駆動する油圧回路に於いては、図１のようなリリーフ弁ａとチェック弁ｂを組み合わせたブレーキ弁ｃが一般的に使用されている。該油圧回路に於いては、旋回体を駆動する油圧モータｄを停止させるとき、その往復の管路ｅ，ｆに設けた切換弁ｇを中立位置に戻して管路ｅ，ｆを閉じるが、該油圧モータｄは旋回しているためにポンプ作用をし、リリーフ弁ａが作動してブレーキ圧力が上昇し、停止する。しかし、旋回停止後、ＡポートとＢポートで残圧が異なるため、油圧モータｄに揺れ戻り現象が発生する。例えば、モータｄが矢印方向に旋回している状態で切換弁ｇを中立位置に戻し、ブレーキをかけると、Ｂポート側の管路ｆに高圧が発生する。その時のＢポートの圧力P_Bと押込側のＡポートの圧力P_Aは図２のように変動し、モータｄの回転波形は曲線Ｃのように変動する。

【０００３】つまり、切換弁ｇを中立位置に戻したとき、Ｂポート側が圧力P_Bに昇圧する。その後Ｒ点に於いてリリーフ弁ａがレシートする。レシートする圧力P_Bはまだ高いので、Ｂポート側の管路ｆにはその圧力P_Bが完全にこもってしまう。その後、Ｂポート側の管路

ｆの配管ボリュームによるアキュームレータ効果及び旋回体系のバックラッシュ等によりＢポート側圧力P_Bは油圧モータｄを逆転させるエネルギーとなり、該油圧モータｄは矢印と反対方向に回転する。すると前記のブレーキ時と同様に油圧モータｄがポンプ作用し、今度はP_AがP_Bより高くなる。圧力P_Aが高くなると油圧モータｄが再び矢印方向に回転する。以上のように圧力P_A、P_Bが交互に高くなるので、油圧モータｄは数回の揺れ戻りを繰り返し起しながら停止する。

【０００４】こうした揺れ戻りを防止するために、以前より多くの手段が提案されており、その手段として、各管路に揺れ戻り防止弁を設けたものと、各管路を短絡させて揺れ戻り防止弁を設けたものとに大別することが出来る。前者の手段よりも後者の手段の方が１つの弁に集約できるので回路構成が簡略化されて製作、組立配管、保守が容易になる利点がある。

【０００５】後者の手段の例としては、図３に示すようなオンオフ弁ｈを設けたもの（特開昭５７－１８０３号公報）が公知である。しかし、このようなオンオフ弁を設けたものは、リリーフ弁の設定圧力によりオンオフ弁の作動圧力（スプリング力）を変えねばならず、オンオフ弁の作動圧力は、リリーフ弁の設定圧力に影響されるため高圧となり、スプリングの荷重が高くなってそのためオンオフ弁の開閉弁のスピード調整が難しいという欠点がある。

【０００６】こうした欠点を解決するため、出願人は、先に、図４に示すような、リリーフ弁ａとチェック弁ｂとで構成されたブレーキ弁ｃで油圧モータｄにブレーキを与えるようにしたものに於いて、該リリーフ弁ａのタンク戻り回路ｉと該チェック弁ｂの流入回路ｊとの間に、該タンク戻り回路ｉの流体圧力で開かれるばね負荷形チェック弁ｋとこれに並行な絞り弁ｌとを設け、該ばね負荷形チェック弁の前後の圧力により、油圧モータｄの往復の管路ｅ、ｆ間を結んだ短絡回路ｍに設けた閉じ位置ｎと絞り位置ｏを有すると共に該閉じ位置方向にばねｐにより付勢されたスプール形の短絡弁ｑを作動させるようにした装置を提案した（実願平５－１５０４号）。

【０００７】

【発明が解決しようとする課題】図４に示した装置では、絞り弁ｌの調整で短絡弁ｑの移動時間を任意に調整できるという簡便さがあるが、油圧モータｄの起動時にも短絡弁ｑが絞り位置ｏに移動して、油圧モータｄへの供給流量の一部が短絡回路ｍを介して供給側の管路から戻り側の管路へと流れ込み、油圧モータｄの効率が悪くなる不都合を伴う。

【０００８】その原因は、通常はポンプから切換弁ｇへの供給回路に回路リリーフ弁ｒが回路保護のために設けられており、これのリリーフ設定圧力がブレーキ弁ｃのリリーフ弁ａのリリーフ設定圧力と略等しい程度に設定

されていることが多く、このような場合、油圧モータの起動時に、両リリーフ弁ａ、ｒが干渉して作動し、短絡弁ｑが絞り位置ｏに切り換わり、油圧モータｄに供給される流量の一部が戻りの管路にバイパスされ、油圧モータｄへの供給流量が減り、その容積効率が悪くなる。また、チェック弁ｂの前後の差圧を短絡弁ｑに導くパイロットラインｓ、ｔには油の流れが殆どなく、そのため、気温が低いとパイロットラインｓ、ｔの油の粘度が常に高いままになり、短絡弁ｑの開閉に要する時間が長引き、揺れ戻り防止の作動が緩慢になって好ましくない。

【０００９】本発明は、ブレーキ弁を構成するリリーフ弁のタンク戻り回路にばね負荷形チェック弁と絞り弁を並行に設け、これの前後の差圧で往復の管路を短絡させる閉じ位置と絞り位置を有する短絡弁の作動を制御する揺れ戻り防止装置を設けたことによる油圧モータの容積効率の低下を防止することを目的するものである。

【００１０】

【課題を解決するための手段】本発明では、切換弁と油圧モータとを結ぶ往復の管路に、該管路の流体をタンクへ排出するリリーフ弁と、該管路へタンク戻りの流体の流入を許容するチェック弁とで構成されたブレーキ弁を設けて該油圧モータにブレーキを与えるようにし、該リリーフ弁のタンク戻り回路と該チェック弁の流入回路との間に、該タンク戻り回路からの流体により開かれるばね負荷形チェック弁とこれに並行な絞り弁とを設け、該往復の管路間を結んだ短絡回路に閉じ位置と絞り位置を有すると共に該閉じ位置方向にばねにより付勢されたスプール形の短絡弁を設け、該短絡弁のスプールのばね側室をタンクに接続すると共にその反対側の室を該ばね負荷形チェック弁の上流側のタンク戻り回路に接続した揺れ戻り防止装置に於いて、該短絡弁に、該閉じ位置と絞り位置の他に該ばねを撓めて該絞り位置を越えて移動した位置に第２閉じ位置を設けることにより、上記の目的を達成するようにした。

【００１１】

【作用】油圧モータの通常回転時には、該油圧モータの押込側・出口側が共に低圧であるためにブレーキ弁のリリーフ弁は作動せず、短絡弁は閉じたままになる。切換弁を中立位置に戻すと、油圧モータが慣性で回転するためにポンプ作用を営み、該油圧モータの出口側の圧力が高まって該リリーフ弁が作動し、該リリーフ弁からタンクにばね負荷形のチェック弁を介して流体が流れるが、該短絡弁のばねは該ばね負荷形チェック弁のばねよりも弱いので、短絡弁が絞り位置を過ぎて第２閉じ位置まで移動し、出口側管路の圧力は該ばね負荷形チェック弁を介して排出され、ブレーキが掛かる。油圧モータの停止直前には、ブレーキ圧力は徐々に低くなるので短絡弁は絞り位置に戻り、該短絡弁が絞り位置にある間に油圧モータの出口側の昇圧を押込側に流体を循環させることにより防止し、揺れ戻りが防止される。該ブレーキ弁のリリーフ弁は、油圧モータの起動時に供給側の管路に発生する圧力で開弁することがあるが、このような場合には比較的大量の流体が該リリーフ弁を流れるので、比較的大きな差圧がばね負荷形チェック弁の前後に発生し、この差圧によって該短絡弁はこれのばねに抗してストロークエンドの第２閉じ位置まで移動する。そのため、短絡回路は開かず油圧モータの容積効率を低下させることがない。

【００１２】

【実施例】本発明の実施例を図面に基づき説明すると、図５に於いて符号１は油圧ポンプ２に切換弁３を介して接続した管路（又は油路）４、５を流れる流体により駆動される油圧モータで、該油圧モータ１には油圧ショベルの旋回体等が連結される。該管路４、５の夫々には、各管路の高圧流体をタンク６に排出するリリーフ弁７、８と、各管路へタンク６から流体を補充するためのチェック弁９、１０とで構成されたブレーキ弁１１が設けられる。１２はリリーフ弁７、８からのタンク戻り回路で、この回路１２の一部をチェック弁９、１０の流入回路１３と共用するようにした。

【００１３】該油圧モータ１の停止時に於ける揺れ戻りを防止するために、該リリーフ弁７、８のタンク戻り回路１２と該チェック弁９、１０のタンクからの流入回路１３との間に、該タンク戻り回路１２からの流体により開かれるばね負荷形チェック弁１４とこれに並行な絞り弁１５とを設け、該管路４、５間を結んだ短絡回路１６に閉じ位置１７と絞り位置１８を有する短絡弁１９が設けられる。該短絡弁１９は、定常状態では閉じ位置に位置するように弱いばね２０により押されたスプール形の短絡弁であり、該短絡弁のスプールの一端が面するばね側室をパイロットライン２２ａによりタンクに接続すると共に、該スプールの他端が面する反対側の室を該ばね負荷形チェック弁１４の上流側のタンク戻り回路１２にパイロットライン２２ｂにより接続した。該ばね負荷形チェック弁１４のばね２１の開弁圧力は、短絡弁１９のばね２０の開弁圧力よりも高く設定するものとし、該絞り弁１５を可変絞りに構成して該短絡弁１９が絞り位置１８から閉じ位置１７に移動する時間の調整を行えるようにした。２４は切換弁３の前方に設けられる回路リリーフ弁で、これの設定圧力はブレーキ弁１１のリリーフ弁７、８の設定圧力と同等もしくはそれ以上に設定される。

【００１４】以上の構成によれば、切換弁３が切換えられて油圧ポンプ２の吐出流体が管路４から油圧モータ１を介して管路５に流れており、該油圧モータ１が旋回体を駆動している場合、該油圧モータ１の押込側・出口側が共に低圧であるので、リリーフ弁７、８は作動しない。該切換弁３を中立位置に戻し、該油圧モータ１の回転を停止させた時には、油圧モータ１が慣性によりポンプ作用を営み、モータ１の出口側の閉鎖された管路５の

5

圧力が高まり、リリーフ弁８が管路５の圧力を排除すべく開き、その圧力はばね負荷形チェック弁１４を介してタンク６へと排出されると共に、パイロット回路２２ｂを介して短絡弁１９を絞り位置１８に切換えるべく作用する。該管路５に発生するブレーキ圧力により油圧モータ１にブレーキが掛かるが、該油圧モータ１の停止直前には、ブレーキ圧力は図６の曲線Ｄで示すように徐々に低下し、リリーフ弁８はブレーキ圧力がＲ点にまで低下したときレシートして閉弁状態になる。このレシートしたとき出口側の管路５に圧力が残存しているために油圧モータ１に揺り戻しが発生することになるが、上記の構成としたことにより、リリーフ弁８がレシートしても短絡弁１９は絞り弁１５があるためにばね２０に押されて図６の曲線Ｆのように徐々に開弁状態から閉弁状態に変化し、この間に油圧モータ１が停止しても該管路５に残存するブレーキ圧力は該短絡弁１９を介して押込側の管路４に循環するので、油圧モータ１の停止時に出口側の昇圧により油圧モータ１が揺れ戻ることなく停止する。短絡弁１９が絞り位置１８から閉じ位置１７へ移動する時間は、ばね負荷形チェック弁１４に並行の絞り弁１５の開度調整により自在に設定できる。

【００１５】こうした構成・作用は、出願人が先に提案した装置と特に変わりがないが、本発明では、該短絡弁１９に、該閉じ位置１７と絞り位置１８の他に該ばね２０を撓めて該絞り位置１８を越えて移動した位置に第２閉じ位置２５を設け、ブレーキ弁１１のリリーフ弁７、８が開いてもばね負荷形チェック弁１４の前後の差圧が予定の範囲でないときは短絡回路１６の閉鎖し、これによりブレーキ弁の作動時に於ける油圧モータ１の容積効率の低下を防止するようにした。

【００１６】該短絡弁１９はスプール形弁であるから、第２閉じ位置２５を設けることにより絞り位置１８は中間の位置になり、差圧が大きさに応じて閉じ位置１７、絞り位置１８或は第２閉じ位置２５に切り換わる。切換弁３を中立位置から切り換えて油圧モータ１を起動したときには、油圧モータ１の負荷圧が大きいため、ブレーキ弁１１のリリーフ弁７又は８が開弁して油圧モータ１に供給される管路の流量の一部がタンク６へ放出されることが多いが、この場合、ばね負荷形チェック弁１４の前後の差圧が比較的大きくなるので、短絡弁１９はばね２０に抗して第２閉じ位置２５に切換わり、短絡回路１６を遮断するため、該リリーフ弁７又は８からタンク６へ放出される流量以外は油圧モータ１に供給されることになり、これの容積効率が向上する。油圧モータ１が加速或は定速回転になると、押込側の管路の圧力が起動時よりも低くなるので、ブレーキ弁１１のリリーフ弁７又は８が閉じ、パイロットライン２２ａ、２２ｂは共にタンク圧になり、短絡弁１９はばね２０で閉じ位置１７に戻され、押込側の管路に供給された流量は油圧モータ１を循環して出口側管路からタンクへ戻る。油圧モータ１

6

の停止のために切換弁３を中立位置に戻したときは、油圧モータ１が慣性で回転するためにポンプ作用を営み、その出口側の圧力が高まって該リリーフ弁７又は８が作動し、該リリーフ弁からタンクにばね負荷形チェック弁１４を介して流体が流れるが、該短絡弁１９のばね２０は該ばね負荷形チェック弁２１のばねよりも弱いので、該ばね負荷形チェック弁２１が開く前に短絡弁１９が絞り位置１８を過ぎて第２閉じ位置２５まで移動し、その後、出口側管路の圧力は該ばね負荷形チェック弁を介して排出され、該出口側管路の圧力のためにブレーキが掛かる。油圧モータ１の停止直前には、ブレーキ圧力は徐々に低くなり、その圧力が設定圧力になったところで短絡弁１９は絞り位置１８に戻り、この位置にある間に油圧モータの出口側の昇圧を押込側に流体を循環させることにより防止し、揺れ戻りが防止される。

【００１７】該パイロットライン２２ａに、図７に示すように、第２チェック弁２９とこれに並行な可変の第２絞り弁３０とを介在させれば、短絡弁１９は第２チェック弁２９のために閉じ位置１７から第２閉じ位置２５の方向へは迅速に作動するが、その逆方向へは第２絞り弁３０を調節してその戻り作動時間を調節することができ、絞り位置１８にある時間を長引かせて揺れ戻り防止の能力を向上させることができる。尚、図７の例では、該短絡弁１９のスプールのばね側室と反対側の室を絞り弁２６及び絞り位置１８の通路２７を介して接続回路２８により連通させ、該短絡弁１９が絞り位置１８に位置したとき、リリーフ弁７、８を通過した油温の上昇した油が両室を流れるようにした。

【００１８】

【発明の効果】以上のように本発明によるときは、ブレーキ弁のリリーフ弁のタンク戻り回路とチェック弁の流入回路の間に、ばね負荷形チェック弁とこれに並行な絞り弁とを設け、これの前後の圧力を短絡回路のばねで押されたスプール形の短絡弁に導く形式の揺れ戻り防止装置に於いて、該短絡弁に、該閉じ位置と絞り位置の他に該ばねを撓めて該絞り位置を越えて移動した位置に第２閉じ位置を設けたので、起動時に該短絡回路を介して短絡する不都合が解消され、油圧モータの容積効率が向上する効果が得られ、該短絡弁と該ばね負荷形チェック弁の上流側を結ぶパイロットラインに第２チェック弁とこれに平行な第２絞り弁を設けたので、該短絡弁が絞り位置で作動する時間を調節できて使用上便利になる等の効果がある。

【図面の簡単な説明】

【図１】従来例の線図

【図２】図１の場合の油圧モータの揺れ戻りの原因の説明図

【図３】従来の揺れ戻り防止装置の１例の線図

【図４】先に提案した揺れ戻り防止装置の線図

【図５】本発明の実施例の線図

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【図６】図５の揺れ戻り防止の説明図

【図７】請求項２に記載の発明の実施例の線図

【符号の説明】

１　油圧モータ　　２　油圧ポンプ　　３　切換弁

４、５　作動回路　　６　タンク　　７、８　リリーフ弁

９、１０　チェック弁　　１１　ブレーキ弁　　１２＊　＊　タンク戻り回路

１３　流入回路　　１４　ばね負荷形チェック弁

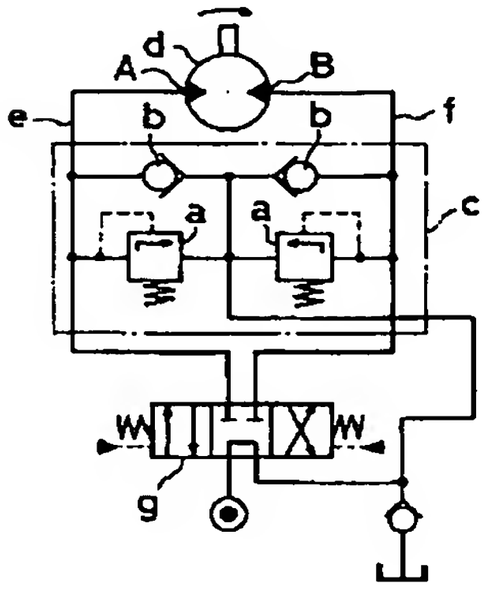
１５　絞り弁

１６　短絡回路　　１７　閉じ位置　　１８　絞り位置

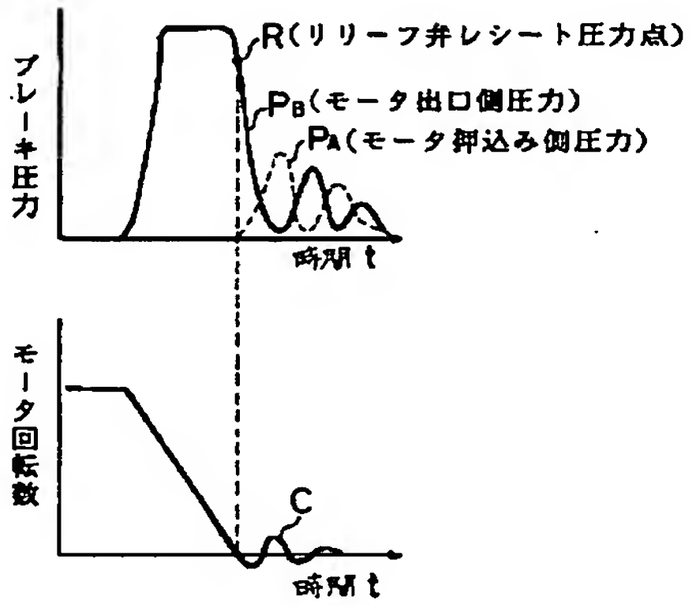
１９　短絡弁　　２０　ばね　　２５　第２閉じ位置

２９　第２チェック弁　　３０　第２絞り弁

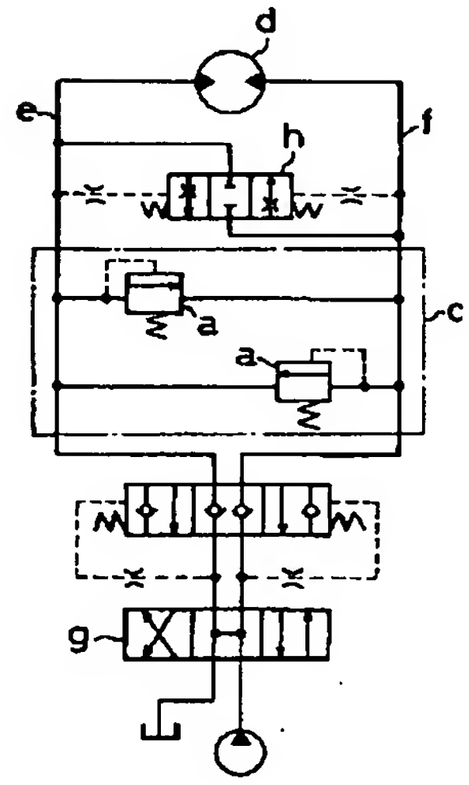
【図１】



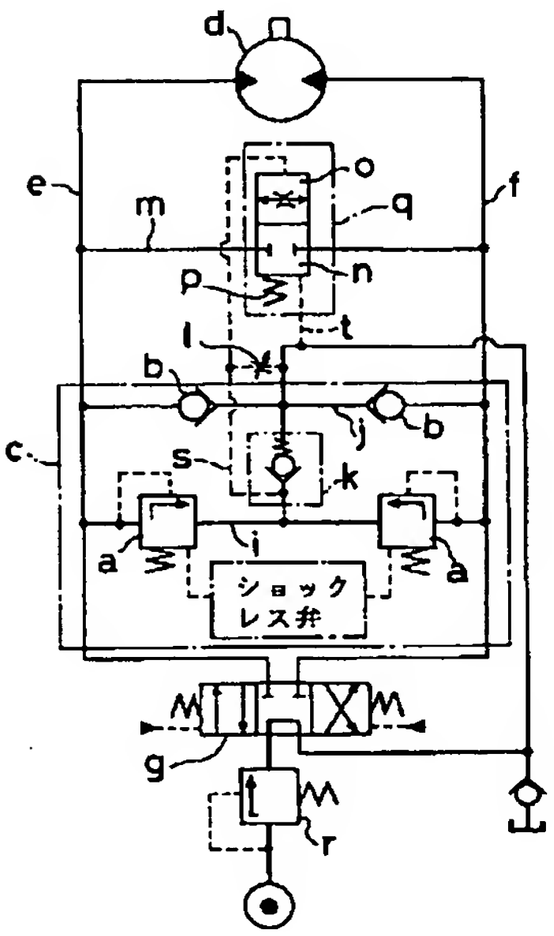
【図２】



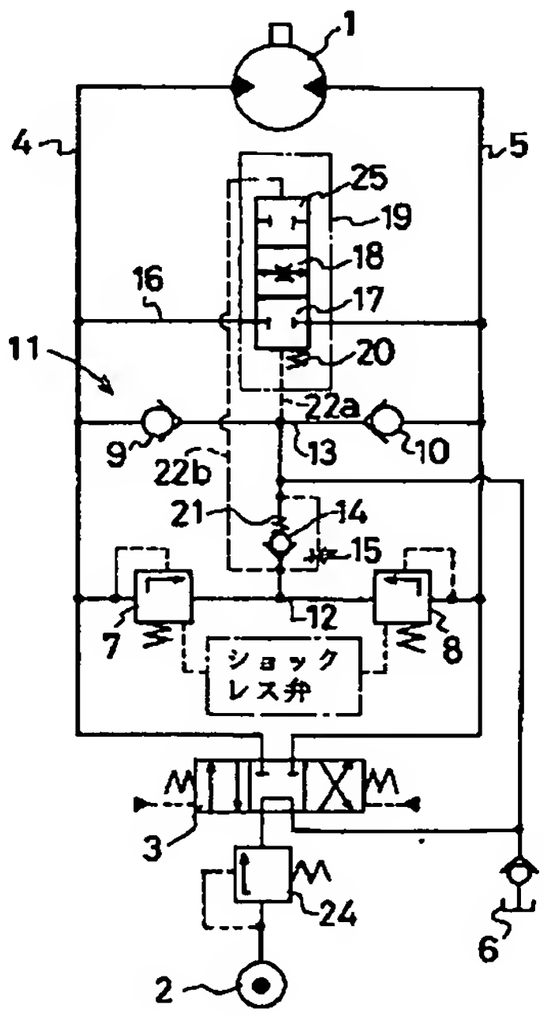
【図３】



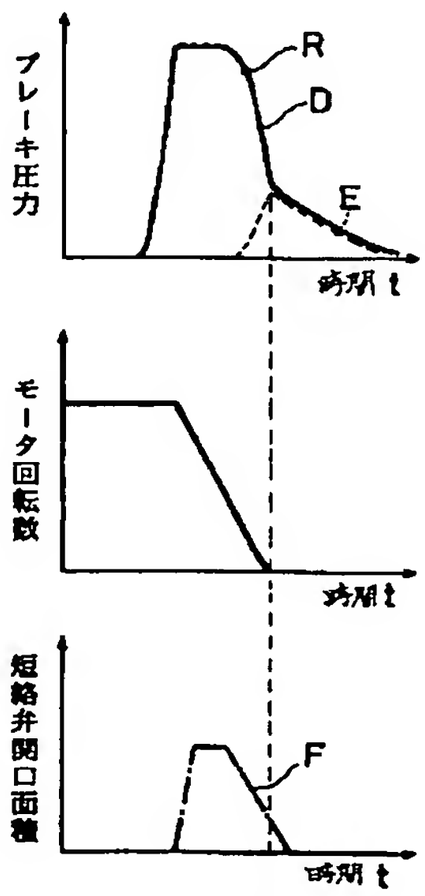
【図４】



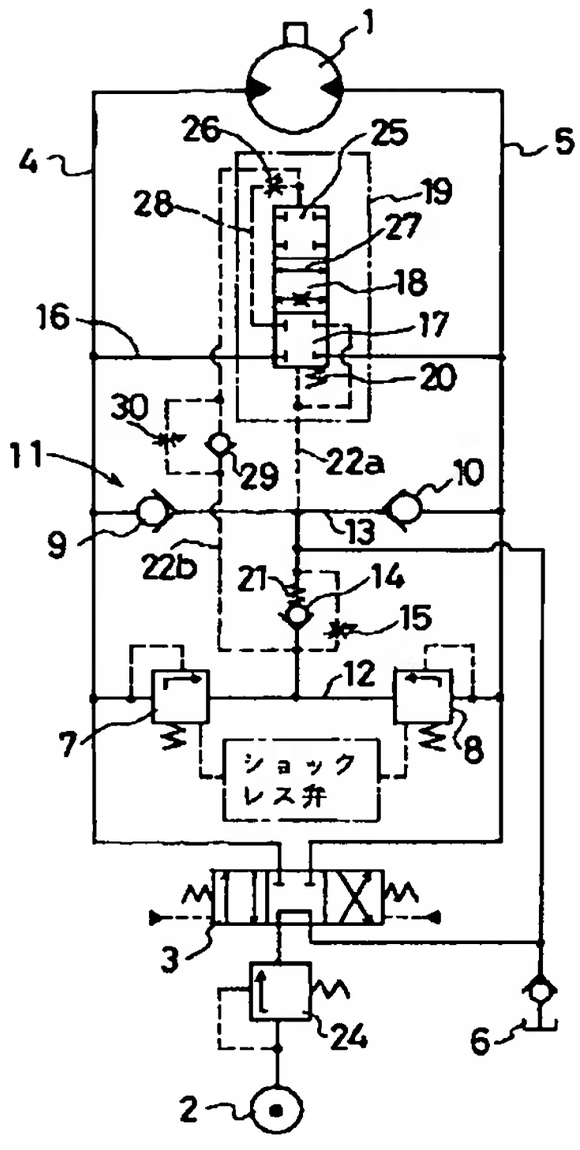
【図５】



【図６】



【図７】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ショック
レス弁
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